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Crowdsourced Disaster Management System

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ABSTRACT: When a crisis or a disaster occurs, victims often use social media to disseminate situational information. This project leverages crowdsourcing technique and verifies the truthfulness of the crowdsourced information. It represents the mined data on the map. Additionally, it also provides colour demarcations of the area based on its current status, i.e., blue colour bubbles on the map indicate that the area is safe while red depicts that the area is not yet been rectified. By this, humanitarian groups and government officials could carry out relief work in the right place at the right time.

KEYWORDS: Crowdsourcing, Disaster, Disaster management, OSM; OpenStreetMap, NLP: Natural Language Processing, Machine Learning, Data Mining.

I. INTRODUCTION

Natural hazards affect millions of people every year worldwide. In 2016, 24.2 million people were forced to abandon their home due to the strike of a natural disaster. Moreover, in the last twenty years over 1.35 million died as a result of their vulnerability and exposure to natural hazards, and over 4 billion were displaced and left homeless, injured or in need of emergency assistance. With the ongoing rise in global temperatures due to climate change, the magnitude and occurrence of extreme weather events is more likely to grow. However, measures and actions can be implemented to mitigate the effects of these disasters. Crowdsourced disaster response, until a few years ago informal and often haphazard, is now getting more organized, and is being embraced by official humanitarian organizations and integrated into relief operations. Volunteer efforts have multiplied thanks to the arrival of online mapping tools, the increasing popularity of social networks such as Twitter and Facebook, and the spread of mobiles. Objective of the projects is to provide citizens and communities with a higher situational awareness in disasters by allowing them to send/receive geolocalised real-time reports compounded with digital information like photos or videos of an emergency event to notify the responders and decision makers. In turn, emergency managers will be able to disseminate crucial data and indications, among emergency operators and citizens, to avoid disaster-affected areas or adopting mitigating measures suitable to reduce the impact of hazardous events. The technology stack required for developing this application is cited in SECTION-II

II. TECHNOLOGIES REQUIRED

For the implementation of the proposed system we require various technologies such as R Programming Language, R Studio, OpenStreetMap, Crowdsourcing, and a MySQL database.

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2.1 R Studio

RStudio is a free and open-source integrated development environment for R, a programming language for statistical computing and graphics. RStudio was founded by JJ Allaire, creator of the programming language ColdFusion.

2.2 R

R is a programming language and free software environment for statistical computing and graphics that is supported by the R Foundation for Statistical Computing.

2.3 Crowdsourcing

Crowdsourcing is a sourcing model in which individuals or organizations obtain goods and services, including ideas and finances, from a large, relatively open and often rapidly-evolving group of internet users; it divides work between participants to achieve a cumulative result. As a mode of sourcing, crowdsourcing existed prior to the digital age

2.4 MySQL

The backend that is used for database management is MySQL. Other Database Management Systems like H2, Microsoft SQL can also be used.

2.5 OpenStreetMap

The OpenStreetMap Foundation is a company limited by guarantee, registered in England and Wales on 22 August 2006. It is a non-profit foundation whose aim is to support and enable the development of freely-reusable geospatial data.

2.6 OpenNLP

The Apache OpenNLP library is a machine learning based toolkit for the processing of natural language text. It supports the most common NLP tasks, such as language detection, tokenization, sentence segmentation, part-of-speech tagging, named-entity extraction, chunking, parsing and coreference resolution. These tasks are usually required to build more advanced text processing services.

2.7 Data Mining

Data mining is the process of discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database systems.

The Proposed System is explained in SECTION-III.

III. PROPOSED SYSTEM

The proposed system has the following major steps in it. The steps are explained below. The architectural diagram is shown in Fig 3.1.

3.1 Reading data

It involves the following steps:

- i. **Installing Packages**
Packages like OpenNLP is installed

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- ii. **Include Packages into current working session**
The installed packages are included into the code using the “library” function.
- iii. **Read dataset**
The data are read from .csv files

3.2 Pre-Processing

It involves the following steps:

- i. **Convert Case**
Make the dataset that was read in the previous step uniform by converting the entire text into uppercase or lowercase.
- ii. **Filter out numbers**
Separate digits from rest of the words to get more quality.
- iii. **Remove unwanted strings**
Eliminate texts that are not essential and removal of those won't change the context of the dataset. For example, conjunctions, adverbs etc.

3.3 Apply NLP

It involves the following steps:

- i. **Use OpenNLP**
The OpenNLP software is used to perform the NLP tasks given below.
- ii. **Sentence Detection**
The boundary of each sentence is identified by a package called “koRpus”.
- iii. **Annotate Text**
The sentences are categorized and labeled.
- iv. **Tokenization**
The words in the sentence are chopped into pieces so as to get the tokens.
- v. **Extract pairs of tokens and POS tags**
The tokens and annotations are paired together.

3.4 Show the output in map

It involves the following steps:

- i. **Read the data from NLP**
The POS annotation and token pairs are stored in the database. Once the OSM is invoked, it fetches data directly from the database.
- ii. **Code HTML and PHP**
To represent the OSM on the web browser code the UI part using markup languages like PHP and HTML.
- iii. **Integrate Leaflet for map view**
Leaflet is an open source JavaScript library for producing interactive map

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The Algorithms used are discussed in SECTION-IV.

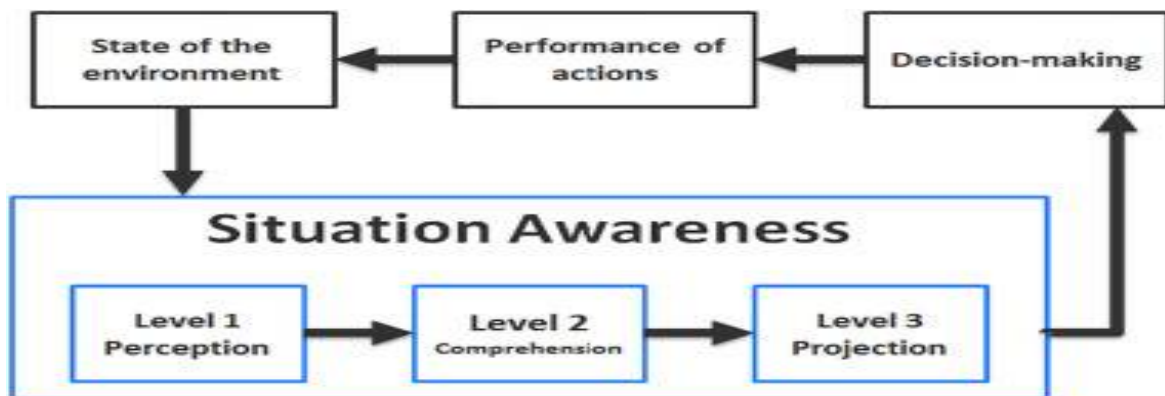


Fig 3.1 Architectural Diagram

IV.ALGORITHMS

The algorithms used in this project are explained below.

4.1 Parts-of-speech Algorithm

Using this algorithm, we assign grammatical tags to words. It resolves the ambiguity as it tags the words based on context like verb, noun etc. This is illustrated diagrammatically in the figure 4.1.

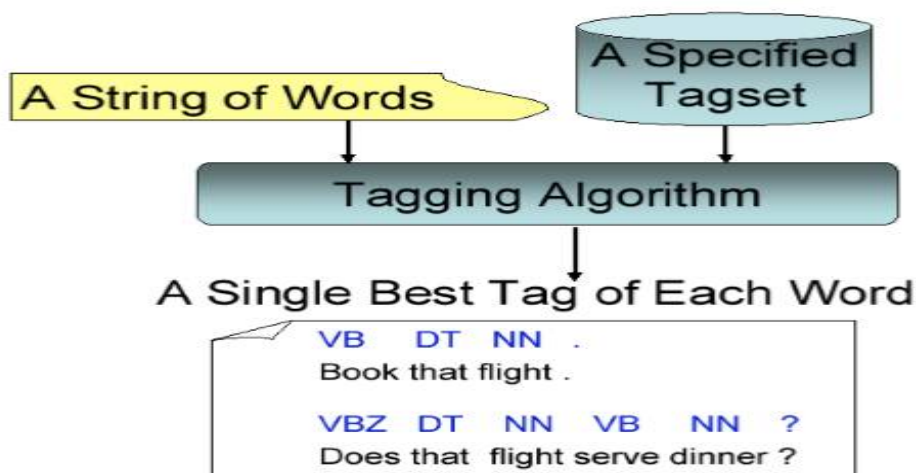


Fig 4.1 POS Algorithm

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4.2 Latent Semantic Analysis

This algorithm simulates the meaning of words and passages by analyzing natural text. It closely approximates many aspects of human language learning and understanding. This is illustrated diagrammatically in the figure 4.2.

LSA – Latent Semantic Analysis

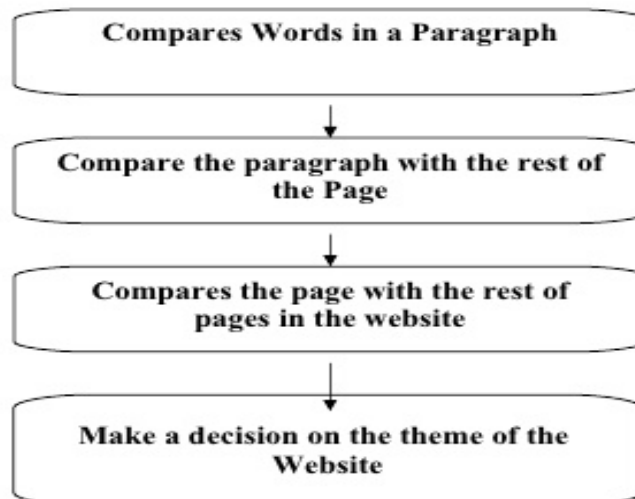


Fig 4.2 LSA Algorithm

The Pros are discussed in SECTION V.

V. PROS

1. The color demarcations on the map helps commuters to know which route is clear and which are still blocked
2. When an area is marked in red, humanitarian workers or government officials can take rescue actions
3. This helps in prioritizing the relief work

The Cons are discussed in SECTION-VI.

VI. CONS

1. Internet connection is needed to access social media and post updates.
2. Charge may get drained from the smartphones and could not be charged in case of power cuts.

The Conclusion is covered under SECTION-VII.

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VII.CONCLUSION

“Lending a helping hand at the right time” this is the main motive of this project. When this application is implemented, many lives could be saved, effect of disaster could be mitigated by taking precautionary measures in areas that were worst affected using data collected from yesteryears.

REFERENCES

- [1] Giles, J., 2005. Special report: internet encyclopedias go head to head. *Nature*, 438, 900901.
- [2] Goodchild, M.F., 2007. Citizens as sensors: the world of volunteered geography. *GeoJournal*, 69 (4), 211221.
- [3] Goodchild, M.F., 2009. Neogeography and the nature of geographic expertise.
- [4] *Location Based Services*, 3 (2), 8296.
- [5] Bishr, M. and Janowicz, K. (2010). Can we Trust Information? - The Case of Volunteered Geographic Information. In Workshop at Future Internet Symposium Towards Digital Earth: Search, Discover and Share Geospatial Data.
- [6] Boulos, M. N. K., Resch, B., Crowley, D. N., Breslin, J. G., Sohn, G., Burtner, R., Pike, W. A., Jezierski, E., and Chuang, K.-Y. S. (2011). Crowdsourcing, citizen sensing and sensor web technologies for public and environmental health surveillance and crisis management: trends, or standards and application examples. *International Journal of Health Geographic's*.
- [7] Chen, L.-C., Liu, Y.-C., and Chan, K.-C. (2006). Integrated community-based disaster management program in taiwan: A case study of shang-an village. *Natural Hazards*, 37, 209–223.
- [8] Chu, E. T.-H., Chen, Y.-L., Liu, J. W. S., and Zao, J. K. (2011). Strategies for crowdsourcing for disaster situation information. In *WIT Transactions on the Built Environment*.
- [9] Coleman, D. J., Georgiadou, Y., Labonte, J., Observation, E., and Canada, N. R. (2009). Volunteered Geographic Information: the nature and motivation of producers —. *International Journal of Spatial Data Infrastructures*.
- [3] de Albuquerque, J. P., Herfort, B., Brenning, A., & Zipf, A. 2015. A Geographic Approach for Combining Social Media and Authoritative Data towards Identifying Useful Information for Disaster Management. *International Journal of Geographical Information Science*: 1–23. Available at:
- [10] <http://www.tandfonline.com/doi/abs/10.1080/3658816.2014.996567>. DOI: <http://dx.doi.org/10.1080/13658816.2014.996567>